



Research Article

# Insect community in riparian zones of Sungai Sepetang, Sungai Rembau and Sungai Chukai of Peninsular Malaysia

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## Abstract

Riparian areas hold vast number of flora and fauna with exceptional contributions to the ecosystem. A study was conducted in Sungai Sepetang, Sungai Rembau and Sungai Chukai to identify the insect community in a riparian zone of Peninsular Malaysia. Sampling was conducted in six consecutive months from December 2017 to May 2018 during both day and night using sweep nets. Twenty sampling stations (S1-S20) had been assembled along the riverbanks with an average distance of 200 m between each station. The 17,530 collected insects were from 11 orders and consisted of Diptera, Coleoptera, Hemiptera, Hymenoptera, Lepidoptera, Neuroptera, Orthoptera, Blattodea, Thysanoptera, Mantodea and Odonata. The three most abundant orders were Diptera (33.84%; 5933 individuals), Coleoptera (28.82%; 5053 individuals) and Hemiptera (25.62%; 4491 individuals). The collected insect community consisted of different guilds such as the

scavenger, predator, herbivore, pollinator and parasitoid. Sungai Sepetang and Sungai Rembau were dominated by mangrove flora, *Sonneratia caseolaris* (Myrtales: Lythraceae), while Sungai Chukai was dominated by *Barringtonia racemosa*. There was a significant difference ( $p < 0.05$ ) in the composition of insects between the three rivers though clustering analysis showed that the insect communities in Sungai Sepetang and Sungai Rembau were 100% similar compared to Sungai Chukai which consisted of a totally different community. There is a significant negative correlation between abundance of insects with salinity and wind speed at Sungai Chukai and Sungai Sepetang.

## Keywords

Insect community, Insect-plant interaction, insect guild, plant community, Sungai Sepetang, Sungai Rembau, Sungai Chukai

## Introduction

Insects are an important faunal group in terrestrial ecosystems where they play vital roles in stabilising the ecosystem. Based on an estimation of global species richness, there are about 5.5 million species of insects already recorded (Stork 2018). An insect may occupy multiple niches as a pollinator, predator, herbivore, parasite, as well as symbiont. It is important to note that insects live simultaneously creating a stable ecosystem dynamic. In response to any environmental change, each species will behave complementarily to one another, as in one species will increase while the other decreases (Schowalter 2016). This group of organism is also sensitive to changes in environment, thus making it possible to be used as an indicator for conservation planning (Kremen et al. 1993). As a sophisticated group of organisms, insects may adapt to diverse environments including aquatic, semi-aquatic and terrestrial habitat. They also inhabit the most extreme conditions on earth (hot springs, tundra, deserts). Nevertheless, certain individual species may only live in a limited dimension of space (Stewart et al. 2015).

The riparian area, an interface between land and water, becomes the habitat to a wide range of flora and fauna. The riparian vegetation apparently supports both aquatic and terrestrial insects especially in providing space to find food, mating partners, refuge, as well as a resting place (Herrera and Dudley 2003). Some riparian floras recorded as being found in Malaysia are *Sonneratia caseolaris*, *Hibiscus tiliaceus*, *Nypa fruticans*, *Acrotichum aureum*, *Areca cathechu*, *Oncosperma tigillarum* and *Ficus* sp. All of these types of vegetation were commonly found in riparian habitats and are associated with firefly in Peninsular Malaysia (Khoo et al. 2012; Wan Juliana et al. 2012) and Thailand (Prasertkul 2018). However, a different flora community was recorded in the riparian area in Sabah where there were *Rizophora apiculata*, *Clerodendrum inerme*, *Glochidion littorale*, *Bruguiera parviflora* and *Excoecaria indica* (Chey 2004; Dawood and Saikim 2016). Uniquely, one of the riparian vegetation, *Sonneratia caseolaris*, known as Berembang, was

found to be the most preferable display tree by the synchronous firefly, *Pteroptyx tener* in Peninsular Malaysia (Jusoh et al. 2010; Wan Jusoh et al. 2010).

Firefly is a huge commodity for this country as it becomes a centre of attraction in the ecotourism industry. A spectacular flashing pattern is produced through light emitting reaction catalysed by Luciferase in the firefly abdomen (Nur Khairunnisa et al. 2016). The flashing light of firefly is captivating for the tourist visiting the riparian zone as its natural habitat. Multiple studies had been done in monitoring of the firefly population in riverbanks of Malaysia (Sulaiman et al. 2017; Hazmi and Sagaff 2017; Foo and Dawood 2017). However, there is a limited amount of research being undertaken in recording other insect communities coexisting in the same riparian area. It is advantageous to have knowledge of other insect populations living in the same riparian zone as an effort for firefly conservation, as well as the entire riparian ecosystem. We want to emphasise the need to study insect communities besides firefly, thus the data on firefly were not included in this study. Hence, this study is a preliminary assessment done to 1) identify the insect community in the riparian zone, 2) identify riparian vegetation in which the insect community resides and 3) determine changes in the insect community across several environmental parameters (salinity, wind speed, temperature and humidity).

## Materials and Method

Samplings were conducted in 20 sampling stations along the riverbanks of Sungai Sepetang, Taping, Perak, (Lat 4.8866–4.9092°N, Lon 100.6311–100.6648°E), Sungai Rembau, Negeri Sembilan (Lat 2.4191–2.4484°N, Lon 102.0654°E) and Sungai Chukai, Kemaman, Terengganu (Lat 4.3076–4.3002°N, Lon 103.3725–103.395°E); see Fig. 1. At each locality, twenty riparian trees along the river with an average distance of 200 m were selected as sampling stations. The sampling stations were assembled at both sides of the riverbanks as shown in Fig. 2. They were labelled as S1- S20 where S1 was located closest to the downstream while S20 was furthest. Samples of insects were collected monthly for six consecutive months (December 2017 to May 2018) during day and night using sweep nets. The net was swept for one minute at each sampling station in the study area. Insect samples were placed in bottles containing ethyl acetate and were then brought to the laboratory for identification up to the lowest taxonomic level possible. Each station was observed from the boat to record the riparian tree and others species composition located within a 5 m radius from the sampling station. Abiotic factors such as temperature (°C), relative humidity (%), salinity (% of NaCl) and wind speed (m/s) were also recorded at each sampling station. Environmental temperature and relative humidity were measured using a thermo hygrometer HI8564 by Hanna Instruments. Salinity was measured using a NaCl meter HI 9835 by Hanna Instruments, while wind speed was measured using an anemometer PCE-007 by PCE instruments.